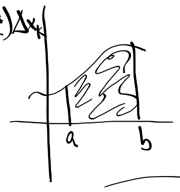
6.6 Fundamental Theorem of Calculus 2012-01-04

$$\int_a^b f(x)\,dx$$

$$= \lim_{\max \Delta x_k \to 0} \sum_{k=1}^{n} f(x_k^*)\Delta x_k$$

"net signed area"



$\int f(x)\,dx$ [the antiderivative] is an area f^n for the region under $f(x)$

$$\int_a^b f(x)\,dx = F(b) - F(a)$$

where $F(x)$ is any antiderivative of $f(x)$

Jan 4-7:00 AM

$$\int_0^1 x^2\,dx$$

$$= \left[\frac{x^3}{3} + C\right]_1 - \left[\frac{x^3}{3} + C\right]_0$$

$$\left(\frac{1}{3} + C\right) - \left(\frac{0}{3} + C\right) = \frac{1}{3}$$

$\int_a^b f(x)\,dx = F(b) - F(a)$

$F(x) = \int f(x)\,dx$

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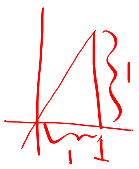
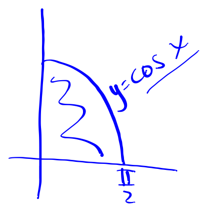
$$\int_0^1 x\,dx = \frac{x^2}{2}\Big|_0^1 = \frac{1}{2} - \frac{0}{2} = \frac{1}{2}$$



$$\int_0^1 x+1\,dx = \left(\frac{x^2}{2} + x\right)\Big|_0^1$$

$$= \left(\frac{1}{2} + 1\right) - (0 + 0) = \frac{3}{2} \checkmark$$

Jan 4-7:00 AM



$$A = \int_0^{\frac{\pi}{2}} \cos x\,dx$$

$$= \sin x \Big|_0^{\pi/2} = \sin\left(\frac{\pi}{2}\right) - \sin(0)$$

$$= 1 - 0 = 1$$

If it was lame, it was probably Kreidler

Jan 4-7:00 AM

$$\int_1^9 \sqrt{x}\,dx$$

$$\int x^{\frac{1}{2}}\,dx = \frac{2x^{3/2}}{3} + C$$

$$\frac{2(9)^{3/2}}{3} - \frac{2(1)^{3/2}}{3}$$

$$\frac{54}{3} - \frac{2}{3}$$

$$\frac{52}{3}$$

$$\int_4^9 x^2\sqrt{x}\,dx \quad = x^2 \cdot x^{1/2} = x^{5/2}$$

$f(x) = x^{2.5}$ $F(x) = \frac{x^{3.5}}{3.5}$

$$\frac{9^{3.5}}{3.5} - \frac{4^{3.5}}{3.5} = 588.3$$

$$\frac{2x^{7/2}}{7}\Big|_4^9 = \frac{2}{7}\left[3^7 - 2^7\right]$$

$$= \frac{2}{7}\left[2187 - 128\right]$$

3
9
27
81
243
729
2187

$$= \frac{2}{7}\left[2059\right] = \frac{4118}{7} = 588.285714$$

$F(x) = \int f(x)\,dx$

$$\int_1^e \frac{1}{x}\,dx$$

$$= \int_1^e x^{-1}\,dx$$

$$= [\ln(x)]_e - [\ln(x)]_1$$

$$= 1 - 0$$

$$= 1$$

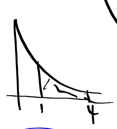
Jan 4-7:00 AM

$$A = \int_1^2 \frac{1}{x}\,dx$$

$$= (\ln x)\Big|_1^2 = \ln 2 - \ln 1$$

$$= \ln 2$$

$\ln 4$



$$\ln x = \int_1^x \frac{1}{t}\,dt$$

$$\int_a^b f(x)\,dx$$

$$\int_a^b f(t)\,dt$$

Jan 4-8:14 AM

HW) 6.6/9-22

+ 30-40

for 3rd period

$$\int_{-1}^{2} x(1+x^3)\,dx =$$

fnInt(x(1+x³), x, -1, 2)

Jan 4-8:20 AM

6.6/9-22 even and odd

6.6 9) $\int_{-3}^{0} (x^2-4x+7)\,dx$

12) $\int_{1}^{2} \frac{1}{x^6}\,dx$

10) $\int_{-1}^{2} x(1+x^3)\,dx$

13) $\int_{4}^{9} 2x\sqrt{x}\,dx$

11) $\int_{1}^{3} \frac{1}{x^2}\,dx$

14) $\int_{1}^{8} 5x^{2/3}-4x^{-2}\,dx$

15) $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \sin\theta\,d\theta$

16) $\int_{0}^{\frac{\pi}{4}} \sec^2\theta\,d\theta$

17) $\int_{-\frac{\pi}{4}}^{\frac{\pi}{4}} \cos x\,dx$

18) $\int_{0}^{1} x-\sec x\tan x\,dx$

Jan 4-8:26 AM

$$\int_{-1}^{2} x(1+x^3)\,dx$$

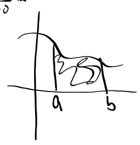
fnInt(x(1+x³), x, -1, 2)

MATH 9

Jan 4-12:26 PM

6.6 Fundamental Theorem of Calculus 2012-01-04

$$\int_{a}^{b} f(x)\,dx = \lim_{\max \Delta x_k \to 0} \sum_{k=1}^{n} f(x_k^*)\Delta x_k$$



$\int f(x)\,dx$ [[the antiderivative]]

provided $\frac{d}{dx}\left(\int f(x)\,dx\right) = f(x)$

is an area function for the area under $f(x)$

$$\int_{a}^{b} f(x)\,dx = F(b) - F(a)$$

where $F(x)$ is $\int f(x)\,dx$.

Jan 4-8:26 AM

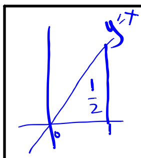
$$\int_{0}^{1} x^2\,dx$$

$$= \left[\frac{x^3}{3} + C\right]_0^1 =$$

$$\left(\frac{(1)^3}{3}+C\right) - \left(\frac{(0)^3}{3}+C\right) = \frac{1}{3} + C - \frac{0}{3} - C = \frac{1}{3}$$

$\int_a^b f(x)\,dx = F(b) - F(a)$ where $F(x)$ is an antideriv.

Jan 4-11:23 AM

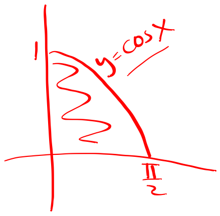


$$\int_{0}^{1} x\,dx = \left(\frac{x^2}{2}+C\right)\Bigg|_0^1$$

$$= \left(\frac{1}{2}+C\right) - (0+C) = \frac{1}{2}$$

$$\int_{0}^{1} x\,dx = \frac{x^2}{2}\Bigg|_0^1 = \frac{1}{2} - 0 = \frac{1}{2}$$

Jan 4-11:23 AM



$$\int_0^{\frac{\pi}{2}} \cos x \, dx$$

$$= (\sin x)\Big|_0^{\pi/2}$$

$$= \sin\tfrac{\pi}{2} - \sin 0 = 1 - 0 = 1$$

Jan 4-11:23 AM

$$\int_4^9 x^2\sqrt{x}\,dx = \int_4^9 x^2 x^{1/2}\,dx = \int_4^9 x^{5/2}\,dx = \frac{x^{7/2}}{\frac{7}{2}}\Big|_4^9 = \frac{2x^{7/2}}{7}\Big|_4^9 =$$

$$\left(\frac{2(9)^{7/2}}{7}\right) - \left(\frac{2(4)^{7/2}}{7}\right)$$

$$9^{7/2} = \left(9^{\frac{1}{2}}\right)^7 = 3^7$$

3, 9, 27, 81, 243, 729, 2187

$$\frac{2}{7}\left(3^7 - 2^7\right) = \frac{2}{7}(2187 - 128) = \frac{2}{7}(2059) = 588.\overline{285714}$$

$$\int_1^9 \sqrt{x}\,dx$$

$$\int_1^9 x^{1/2} = \frac{2x^{3/2}}{3}\Big|_1^9$$

$$\left(\frac{2(9)^{3/2}}{3}\right) - \left(\frac{2(1)^{3/2}}{3}\right)$$

$$\int_1^e \frac{1}{x}\,dx$$

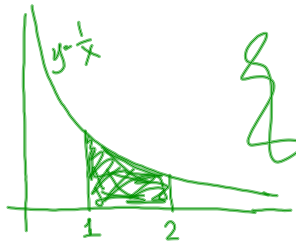
$$\int \frac{1}{x}\,dx = \ln|x| + C$$

$$\ln|e| - \ln|1|$$

$$1 - 0$$

$$\boxed{1}$$

Jan 4-8:26 AM



$$\cancel{\int_1^2 \ln x \, dx}$$

$$\int_1^2 \ln t \, dt$$

$$\ln x = \int_1^x \ln t \, dt$$

Jan 4-12:03 PM